Listing of Claims

This listing of claims will replace all previous versions, and listings, of claims in the application.

1. (original) A multi-modal RF coil capable of being used within an MRI system, comprising:

a segmented annular base ring conductor having a central axis;

a plurality of capacitive electrical connections disposed between segments of the segmented annular base ring conductor;

at least one arcuate conductor symmetrically disposed with respect to the central axis of the base ring conductor and having two ends, one end terminating in direct contact with the base ring conductor, the other end electrically connected to the base ring conductor via at least two of the plurality of capacitive electrical connections at a spatially distinct position along the base ring conductor.

2. (original) The multi-modal RF coil of claim 1, wherein:

the at least one arcuate conductor comprises a single arcuate conductor; and

the RF coil being operable in two modes in phase quadrature to establish a rotating magnetic field phasor orthogonal to a temporally constant uniform magnetic field generated by the MRI system.

3. (original) The multi-modal RF coil of claim 2, wherein:

the base ring conductor is capable of establishing a first of the two modes as a result of current flowing circularly through the annular base ring conductor; and

a second of the two modes is established by 90° phase shifted current flowing through the arcuate conductor and split between two halves of the annular base ring conductor.

4. (original) The multi-modal RF coil of claim 1, wherein:

the at least one arcuate conductor comprises a plurality of arcuate conductors symmetrically disposed with respect to the central axis of the base ring conductor; and

the RF coil is operable in a plurality of modes in phase quadrature to establish a rotating magnetic field phasor orthogonal to a temporally constant uniform magnetic field generated by the MRI system.

5. (original) The multi-modal RF coil of claim 1, wherein the at least one arcuate conductor defines a selected cut in an anatomical region to be imaged by the MRI system.

6. (original) The multi-modal RF coil of claim 1, wherein the base ring conductor is comprised of a plurality of microstrip line segments.

7. (original) The multi-modal RF coil of claim 1, wherein the at least one arcuate conductor is comprised of a plurality of microstrip line segments.

8. (original) The multi-modal RF coil of claim 1, wherein the at least one arcuate conductor further comprises conducting segments and at least one tunable capacitive electrical connection disposed in a gap between the conducting segments for establishing resonance with the inherent coil inductance at the target frequency.

9. (original) The multi-modal RF coil of claim 1, wherein one or more of the plurality of capacitive electrical connections operate so as to tune the RF coil.

10. (original) The multi-modal RF coil of claim 1, wherein at least one of the reactances associated with the plurality of capacitive electrical connections compensates some or all of the inherent coil inductive reactance at the resonant frequency.

11. (original) The multi-modal RF coil of claim 1, wherein at least one of the plurality of capacitive electrical connections match the impedance of transmission lines for connecting the RF coil to receiving electronics.

12. (original) The multi-modal RF coil of claim 1, wherein the RF coil is dimensioned so as to receive a human breast.

13. (original) The multi-modal RF coil of claim 1, further comprising:
two electrical ports for accessing electrical signals induced in the RF coil; and
means for modifying the accessed electrical signals to interface with a single or multi-channel receiver amplifier.

14. (original) A pair of multi-modal RF coils of the type set forth in claim 1, and wherein the pair of RF coils are disposed in a manner so as to enable imaging of two anatomical regions by the MRI system.

15. (original) The pair of multi-modal RF coils of claim 14, wherein the two anatomical regions comprise a pair of human breasts.

16. (original) The pair of multi-modal RF coils of claim 14, further comprising:
two pairs of electrical ports, each pair of electrical ports capable of accessing electrical signals induced in one of the multi-modal RF coils.

17. (original) The pair of multi-modal RF coils of claim 16, further comprising means for modifying the accessed electrical signals to interface with a single-channel receiver amplifier.

18. (original) The pair of multi-modal RF coils of claim 14, further comprising shielding disposed between the pair of multi-modal RF coils.

19. (original) The multi-modal RF coil of claim 1, further comprising one or more PIN diodes arranged in shunt with the plurality of capacitive electrical connections, the diodes

being switchable between high and low impedance states that are capable of operating at a resonant frequency so as to actively tune or de-tune the RF coil.

20. (original) An MRI system, including:

a main magnet component providing a temporally constant and uniform magnetic field;

at least one gradient coil producing a pulsed, linear field gradient;

at least one RF coil acting as a transmitter;

at least one multi-modal RF coil comprising

a segmented annular base ring conductor having a central axis,

a plurality of capacitive electrical connections disposed between segments of the segmented annular base ring conductor, and

at least one arcuate conductor symmetrically disposed with respect to the central axis of the base ring conductor and having two ends, one end terminating in direct contact with the base ring conductor, the other end electrically connected to the base ring conductor via at least two of the plurality of capacitive electrical connections at a spatially distinct position along the base ring conductor; and

electronics for transmitting and receiving electrical signals from the at least one multi-modal RF coil.